REPORT

Remedial Action Turbidity Monitoring Plan

Allied Paper, Inc./Portage Creek/
Kalamazoo River Superfund Site
Kalamazoo, MI

July 1999

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BLASLAND, BOUCK & LEE, INC.
engineers & scientists

TECHNICAL REPORT

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1. Introduction

1.1 General

This Remedial Action Turbidity Monitoring Plan documents to the Michigan Department of Environmental Quality (MDEQ) turbidity measurement procedures in support of remedial activities to be conducted at the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site (Site). This plan specifies turbidity monitoring field procedures, action levels, quality assurance/quality control (QA/QC) procedures, including documentation, standardization, calibration, maintenance, and corrective actions.

As field procedures used in obtaining measurements may have a significant effect on data generated, it is important that standardized protocols be followed and that sample integrity and QA standards be maintained. The procedures outlined here are intended to assure that integrity and quality.

This plan supplements the *Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site Remedial Investigation/Feasibility Study Field Sampling Plan* (FSP; BBL, 1993c) and *Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site Remedial Investigation/Feasibility Study Quality Assurance Project Plan* (QAPP; BBL, 1993a), which were approved by the MDNR in 1993.

1.2 Monitoring Objectives

As part of the remedial activities (e.g., excavation of floodplain soils) performed adjacent to the Kalamazoo River, turbidity monitoring will be performed. Specifically, turbidity in the Kalamazoo River will be monitored during remedial activities to assess the impacts, if any, of those activities on surface water quality and to provide a mechanism to evaluate the effectiveness of erosion control measures as specified in the *Erosion and Sedimentation Control Plan* (ESCP; BBL, 1998).

2. Field Procedures

Erosion associated with remedial activities conducted in or near the Kalamazoo River will be controlled by the measures specified (e.g., silt curtains) in the ESCP. Measurements of turbidity will be made in the Kalamazoo River upstream and downstream of a work area. A significant increase in the level of turbidity at the downstream location would indicate that the erosion control measures in-place are not adequately containing materials disturbed as part of a remedial action.

Monitoring locations will be established approximately 100 feet upstream and 100 feet downstream of each work area. The actual locations will be determined by on-site personnel based upon a qualitative assessment of safety and accessibility, and noted in the field notebook. Downstream samples will be collected in the near-shore area likely to be within the zone of impact of any soil loss resulting from remedial activities.

2.1 Materials

The following materials, as required, will be available during field measurement of turbidity:

- Personal protective equipment (as specified in the Health and Safety Plan [BBL, 1993b]);
- Clean 500 milliliter (mL) amber glass jar;
- Turbidity meter;
- Gelex secondary standards;
- Formazin turbidity standard dilutions;
- Nephelometric sample tubes;
- Cleaning equipment (as required in Appendix F of the FSP);
- Fine screwdriver (for meter calibration adjustments);
- Extra batteries for the meter;
- Distilled/deionized water; and
- Appropriate forms and field notebook.

2.2 Measurement Procedures

2.2.1 Turbidity Measurements

Turbidity measurements will be taken using a standard turbidity meter, such as the Horiba U-10, and following standard procedures. Two monitoring locations will be used, 100 feet upstream and 100 feet downstream of the work location. The measurements will be made daily once per shift, 2 hours into the shift, and at mid-depth, using a 500 mL amber glass jar. To reduce the potential for in-stream disturbances to affect turbidity measurements, the downstream location will be sampled before the upstream location and the sample will be collected with minimal disturbance.

2.2.2 Polychlorinated Biphenyl (PCB) Analyses

Water-column samples for PCB will be collected at each of the two turbidity monitoring locations. One water sample will be collected at each location once per day during the first week of excavation, and will be collected at the same time that samples for turbidity are collected. After the first week of excavation, water samples for PCB analysis will be collected only when/if the turbidity action level is reached, or at the discretion of the MDEQ. All samples will be marked for identification by indicating the type of analysis, the date and time collected, and the location and initials of the sample collector. Sample turnaround time will be two calendar days, and the MDEQ will receive a copy of the analytical report from the laboratory within one day after receipt.

The time of sampling and measurement results will be entered into the field notebook and checked against the action level criteria outlined in Section 3. Any change in turbidity outside of the acceptable range will be reported immediately to the on-site supervisor, so mitigative steps can be taken.

The following steps will be performed when measuring turbidity of a water sample.

1. Turn power switch on to perform a battery check.

2. Press the appropriate range switch: 0-1, 0-10, or 0-100 nephelometric turbidity units (NTU).

3. Place the focusing template into the cell holder and adjust the Zero Control for a reading of zero NTU. Remove focusing template.

4. Fill a clean sample cell to the white line with the sample to be measured and place it into the cell holder. Use the white dot on the sample cell to orient the cell in the same position each time. Cover sample with light shield and allow meter to stabilize.

5. Read and record the turbidity of the sample in the field notebook.

6. Perform a duplicate sample every 10 samples or set of samples, whichever is more frequent.

3. Action Levels

Because of the limitations of turbidity meters and the turbidity levels measured in the Kalamazoo River during the Remedial Investigation (ranging from 3.0 to 71.5 NTU) (see draft *Technical Memorandum 16 - Surface Water Investigation* for more information), an action level criterion of 25 percent variance will apply. In the event that downstream turbidity exceeds the upstream turbidity levels by 25 percent or more, a second sample to verify the turbidity will be collected immediately. If the second test still indicates that the turbidity is 25 percent or more above the upstream turbidity, the remedial activities will be stopped. Erosion control measures will then be evaluated to ensure that all in-place controls are operating properly, and if necessary, repaired or modified to increase effectiveness.

4. Field Quality Assurance/Quality Control Procedures

This section defines and discusses the field QA/QC procedures to be followed during implementation of this plan.

4.1 Documentation

Field personnel will provide comprehensive documentation covering all aspects of the monitoring. This documentation forms a record that will allow reconstruction of field events, thereby aiding the subsequent data review and interpretation process. All documents, records, and information relating to the performance of monitoring at the Site will be retained.

The field notebook will consist of a dedicated, bound, surveyor's-type notebook that will contain an overall record of all activities performed at the Site, including, but not limited to:

- Project name and number;
- Monitoring locations;
- Monitoring dates;
- Weather conditions;
- Monitoring times;
- Readings from the turbidity meter;
- River depth and mid-point depth;
- River current/direction at mid-depth;
- Turbidity meter calibration/operation notes;
- Samplers' names; and
- Any appropriate comments (e.g., any notifications made and to whom; any actions taken as a result of turbidity measurements).

Data will be entered in ink with the date and signature of the individual responsible for data entry; blank pages will be noted as being intentionally blank.

Turbidity test results will be instantaneous and reported on a daily log and QC reports.

4.2 Standardization

Equipment standardization will be performed before each day of measurements to ensure consistently accurate results.

The following steps will be performed to standardize the equipment:

1. Turn the meter off and check the mechanical zero setting. Adjust to a zero NTU reading, if necessary.
2. Turn power switch on and perform a battery check.
3. Place the focusing template into the cell holder. This will block all the light from reaching the detector and allow the meter to be zeroed electronically in Steps 4 and 5.
4. Press the 1.0 range switch and adjust the Zero Control for a reading of zero NTU.
5. Press the 10.0 range switch to verify that the meter still indicates zero NTU. Readjust the Zero Control if necessary.

6. Remove the focusing template and place the appropriate Gelex secondary standard for the turbidity range to be used into the cell holder. Use the index mark on the standard to orient the vial in the same position each time, thereby eliminating variation due to rotation.

7. Place the light shield over the turbidity standard and allow the meter to stabilize.

8. Adjust the span control for a meter reading equal to the value of the Gelex standard in the cell holder. Remove the light shield and turbidity standard.

4.3 Calibration

Each range of the turbidity meter is calibrated at the factory but should be checked from time to time against fresh Formazin turbidity standard dilutions. Three trimmer potentiometers on the amplifier circuit board provide an adjustment for each range. Check each range as described in the following steps and make the appropriate adjustments when necessary, using the procedures described in Appendix D of the FSP.

1. With the meter turned off, check the mechanical zero adjustment on the meter face. Adjust for a zero reading, if necessary.

2. Turn the meter on and perform a battery check. Change battery if needed.

3. Place the focusing template into the cell holder, press the 1.0 range switch, and adjust the Zero Control to obtain a zero NTU reading.

4. Remove the focusing template and insert a 0.75 NTU turbidity standard. Adjust the SPAN control for a corrected 0.75 NTU reading.

5. Remove the 0.75 NTU standard and replace it with a 10 NTU standard. Press the 10.0 range switch. The meter should indicate 10 (± 0.2) NTU. If it does not, thee 10.0 range potentiometer needs adjustment as described in the Range Calibration procedure (Appendix D of the FSP). Adjust the SPAN control for a reading of exactly 10 NTU.

6. Remove the 10 NTU standard and replace it with the cell river and 100 NTU standard. Press the 100 range switch. The meter should indicate 100 (± 2) NTU. If it does not, the 100 range potentiometer needs adjustment as described in the Range Calibration procedure (Appendix D of the FSP).

7. Remove the 100 NTU standard and cell riser and insert the 10 NTU standard. Press the 10.0 NTU range switch. Adjust the SPAN control for a reading of exactly 10 NTU.

8. Remove the 10 NTU standard and replace it with a 0.75 NTU standard. Press thee 1.0 range switch. The meter should indicate the corrected value for the 0.75 NTU standard (± 0.02). If it does not, the 1.0 range potentiometer needs adjustment as described in the Range Calibration procedure (Appendix D of the FSP).

4.4 Maintenance

The following maintenance procedures will be followed:

1. Recharge battery as needed.

2. Store meter in protective casing when not in use.

3. Keep records of use, maintenance, calibration, and any problems and repair.

4. Inspect the meter after use and record the results of the inspection in the field notebook.

5. A replacement meter will be available for overnight shipment.

6. Keep nephelometric sample tubes clean both inside and out. Replace them when they become scratched or etched. Do not handle the tubes in the region where the light beam enters them.

7. Clean the lens periodically.

8. Send the meter back to the manufacturer for service when needed.

4.5 Corrective Actions

Corrective actions include procedures to promptly investigate, document, evaluate, and correct any deficiencies in data quality. If a condition is noted to have an adverse effect on data quality, corrective action will be taken to avoid this condition. Condition identification, cause, and the corrective action implemented will be documented and reported to the BBL Project Manager and Quality Assurance Manager. Implementation of corrective measures will be verified by documented follow-up action.

All project personnel have the responsibility, as part of their normal work duties, to promptly identify and report conditions adverse to data quality. Project personnel will, therefore, continuously monitor ongoing work performance in the normal course of daily responsibilities.

Examples of situations that would require corrective actions include, but are not limited to, the following:

- Protocols, as defined by this plan, have not been followed;
- Procedures have not been performed properly;
- Equipment is not properly calibrated, or is not functioning correctly;
- Results are not completely traceable; or
- Concerns resulting from system or performance audits are identified.

Corrective actions will be documented on a Corrective Action Request Form, as identified in Appendix AA of the QAPP.

References

Blasland, Bouck & Lee, Inc. (BBL). *Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site Erosion and Sedimentation Control Plan*, March 1998.

BBL, *Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site Remedial Investigation/Feasibility Study Quality Assurance Project Plan*, June 1993a.

BBL, *Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site Remedial Investigation/Feasibility Study Health and Safety Plan*, June 1993b.

BBL, *Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site Remedial Investigation/Feasibility Study Field Sampling Plan*, July 1993c.